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A THERAPEUTIC INSIGHTS OF *CLITORIA TERNATEA* LINN FLOWERS IN AN INNOVATIVE SKINCARE FORMULATION

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Abstract:

Background: *Clitoria ternatea Linn of family Fabaceae, originates from tropical Asia and thereafter widely transported throughout South and Central America, East and West Indies, China and India, where it became naturalized. Traditionally it is used as anti-oxidant, anti-inflammatory, anti-aging etc.*

Objective: *The present study was to carry out the Pharmacognostical, Phytochemical and Formulation studies on the flowers of Clitoria ternatea Linn.*

Materials and methods: *The fresh flowers were collected, shade dried and powdered. Macroscopical and microscopical studies of fresh flowers and dried powdered flowers were conducted. Powdered flowers are extracted with Soxhlet apparatus using ethanol as solvent. Ethanolic extract were subjected to phytochemical screening. A herbal soap was prepared from dried powder and ethanolic extract of flowers of Clitoria ternatea Linn. After completion of formulation it was evaluated for various physicochemical parameters.*

Result and discussion: *Microscopy shows the presence of epidermal cells, vascular bundles, trichomes etc. Phytochemical screening revealed the presence of Alkaloids, Flavanoids, Tannins, Carbohydrates and saponins etc. Physicochemical parameters of herbal soap like pH, foam height, foam retention, etc. were determined. This whole study helps to reveal more information about macroscopical and microscopical characters, phytoconstituents present in Clitoria ternatea Linn, parameters for formulating it into an herbal soap.*

Key words: *Clitoria ternatea; Pharmacognosy; Microscopy; Phytochemical; Formulation*

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INTRODUCTION:

The Genus *Clitoria*

Since the morphology of these plants' flowers matches the shape of human female genitalia, the genus *Clitoria* is a direct translation of the Ternate native term telang, which means "Clitoris". A Polish naturalist named Jakob Breyne first mentioned the genus in 1678. He named it Flos clitoridis ternatensibus, which translates to "Ternatean flower of clitoris." Breyne's description includes a picture of the plant. The Ternate location, which is part of the northern Maluku Islands, is the location from which botanist Carl Linnaeus obtained his specimens, and this is where the species name comes from. [1,2]

***Clitoria ternatea* Linn**

It is usually referred to as Butterfly pea belonging to the family Fabaceae[3,4,5]and sub-family Papilionaceae, originates from tropical Asia and is a perennial herbaceous plant with elliptic, obtuse leaves and known as leguminous twiner. It was thereafter widely transported throughout South and Central America, the East and West Indies, China, and India, where it became naturally occurring.[4] *Clitoria ternatea* also known as Asian pigeon wings, blue bellvine, blue pea, cordanfan pea and darwin pea. It blooms alone or in pairs from summer to fall and grows as a vine or creeper that does well in damp, neutral soil. The plant *C.ternatea* is traditionally used for food colouring,

stress, infertility and gonorrhoea.

Fig 1: Plant of *Clitoria ternatea*

Traditional uses of *Clitoria ternatea*[6,7,8,10]

Clitoria ternatea is known to as a very bioactive plant and used in various diseases as folklore medicines. All part of the plant is used as medicine. The roots being used as diuretic and seeds as cathartic. Seeds are mildly laxative, purgative and antihelmintic. Root was used in the treatment of ascetics, enlargement of the abdominal viscera, sore throat and skin diseases. They were also administered with honey and ghee as a general tonic to children for improving mental faculties, muscular strength and complexion tonics. Seeds and leaves were widely used as a brain tonic and to promote memory and intelligence. Juice and flowers were used as an antidote for snake bite. Seeds were used in the swollen joints, crushed seeds are taken with cold or boiled water for urinary problems. Root ash is used for facial care. Root powder is used for jaundice. Root juice applied in the nose for migraine. In Ayurvedic medicine, it has been used as a memory enhancer, antistress, anti-inflammatory, anti-cancer, anxiolytic, anti-depressant, anticonvulsant, tranquilizing and sedative agents. It is also used in neurological disorders.

1. PHARMACOGNOSTICAL STUDIES

a. Morphological characters [32,36,39,41]

The morphological characters like colour, odour, taste, size, shape, extra features of the flower were studied, and the results were tabulated.

b. Preparation of powder [43]

The collected flowers were washed with running tap water to remove adhering materials. Then the flowers were dried under shade. The dried flowers were pulverized mechanically into coarse powder. The coarse powder (passed through sieve no. 18 and retained on sieve no. 60) was collected and used for Pharmacognostical and Phytochemical studies. The fine powder was used for Powder Microscopy.

2. FORMULATION STUDIES [27,28,29]

a. Formulation of herbal soap using dried powder of *Clitoria ternatea* flower

Herbal soap using dried powder of *Clitoria ternatea* flower was prepared by mixing blue colour amorphous powder with soap base. After completion of formulation, it was evaluated for its physicochemical parameters.

Sl.No	Ingredients	Quantity for 100 gm
1.	Soap base	97 gm
2.	Glycerine	2 ml
3.	Fragrance oil	6 -7 drops
4.	Dried powder of *Clitoria ternatea* flower	3 gm

Table no. 1: Ingredients for the formulation of herbal soap.

Procedure

- Weighed 100 g soap base and melted it using double boiling method.
- Added 3gm of dried *Clitoria ternatea* flower powder and allowing it to dissolve in the soap base.
- Added 2ml of glycerin and 6-7 drops of fragrance oil.
- Transfer the mixture into the soap mould while it's still warm and eliminate any remaining air bubbles.
- Kept the mixture for settling. After 30 minutes take it out carefully from the mould.
- Packed the soap in appropriate packages.

b. Evaluation of herbal soap [31,33]

1. **Colour:** When visualising the herbal soap, a white background was used so that the colour could be determined and so that the clarity of formulation could be seen.
2. **Odour/Aroma:** An evaluation of the odour of formulations we used two different methods. The first method included heating the sample on a hot plate. The second method involves inhaling a direct sample by five to six different people, including both males and females.
3. **Shape:** Evaluation of organoleptic properties, such as shape and clarity, was carried out by sensory and visual examination.
4. **pH:** The pH was determined by using pH paper.
5. **Foam Retention:** 25 ml of the soap solution was taken into 100ml graduated measuring cylinder. The cylinder was covered with hand and shake 10 times. The volume of foam at 1min interval for 4 minutes was recorded.
6. **Foam height:** 1gm of sample soap was taken and dispersed in 50ml distilled water .It was then transferred in a measuring cylinder ,and the volume was made up to 100ml and measured the height above the aqueous volume.
7. **Alcohol Insoluble matter:** In a conical flask ,5gm of sample was taken .To this,50ml of worm ethanol was added and it was shaken vigorously ,until the sample was dissolved completely .The solution was filtered through a tared filter paper along with 20ml warm ethanol and dried it at 105^0C for 1hr .The weight of dried paper was noted.
8. **Moisture content:** About 10 gram of the material were heated in a hot air oven at 100 to 105 degrees Celsius for an hour. After that deducted the true weight of the tarred china dish from the total weight of the sample and dish. The weight of the material was recorded, and the method for calculating the percentage of the moisture content that can be found in it is shown.

% Moisture content = Initial weight -final weight / final weight x100

9. **Foam stability:** The Cylinder Shake Method was utilized to determine the Foaming ability. First, in a 100 ml measuring cylinder, we put 30ml of a 1% sample solution. The cylindrical container was covered up with the use of the hand and shaken vigorously 10 times. The volume of the foam after ten minutes was calculated.

    % Foam lost = initial foam height−final foam height / initial foam height x 100%

    Foam stability (after 5 minutes) = 100% foam removed
10. **Foam forming ability:** The Cylinder Shake Method was utilized to determine the Foaming ability. First, in a 100 ml measuring cylinder, we put 50ml of 1% sample solution and shaken vigorously 10 times. After shaking for 1 minute, we measured the height of the foam that had formed and recorded the total volume of foam.
11. **Wetting time:** We take a piece of cotton fabric, cut it into a disc shape with a diameter of one inch, and then measure the sample's weight so that we may determine how long it took the sample to get wet. The next step is to prepare a sample that has been diluted (1% solution), as well as a piece of cotton cloth to lay on top of the sample. The disc made of fabric was allowed to float freely on top of the 1% sample solution. The amount of time that it took for the fabric disc to go from floating to sinking was carefully recorded and referred to as the wetting time. A higher wetting efficiency is associated with a shorter time to sink.
12. **Skin Irritation test:** for the determination of irritancy test, Use the soap sample on clean skin to observe for signs of irritation, such as redness, burning, or itching and 24 hours, the situation was monitored. The irritation test used five volunteers aged 18-25 years by applying a soap preparation to the back of the volunteers' ears. Then leave it for 1x 24 hours, and observe what occurs in the form of skin irritation, itching, heat, dryness, redness, and roughness. The results of the irritation test on all soap samples showed that all volunteers did not irritate.
13. **Dirt dispersion:** First, we prepare a 1% sample solution that was taken in a measuring cylinder and added two drops of ink in to the sample solution. The measuring cylinder was then shaken ten times while being covered by a hand. The ink is present concentrate in the foam is considered to be of low quality, investigate

that. The remaining dirt particles are then found in the water section. The amount of ink found in the foam was noticed.

RESULT AND DISCUSSION:

1. PHARMACOGNOSTICAL STUDIES

a. Morphological evaluation of fresh flower of *Clitoria ternatea* Linn


Fig 2: Morphological evaluation of fresh flower of *Clitoria ternatea* Linn

SL.NO.	Features	Observation
1.	Colour	Dark blue
2.	Shape	Large and pea-like
3.	Size	4-7cm
4.	Symmetry	Bilateral
5.	Inflorescence	Solitary, pairs or clusters
6.	Calyx	5 sepals, gamosepalous
7.	Corolla	5 petals, papilionaceous, irregular
8.	Stamens	10 stamens, diadelphous
9.	Anthers	Dithecous
10.	Ovary	Monocarpellary, Unilocular, Marginal placentation
11.	Style	Simple
12.	Stigma	Incurved, feathery stigma

Table no. 2: Morphological characters of *Clitoria ternatea* Linn

b.Powder characteristics of *Clitoria ternatea* Linn

1. Macroscopical studies of dried flower powder of *Clitoria ternatea* Linn

The dried powder was characterized by its morphological features like:

- Colour: vibrant blue to purple colour.
- Texture: fine and smooth.
- Aroma: mild, earthy frageance.
- Taste: mild, slightly earthy flavour.

Fig 3: Dried powder of *Clitoria ternatea* Linn

3. FORMULATION STUIDIES

a. Formulation of a herbal soap using *Clitoria ternatea* flower

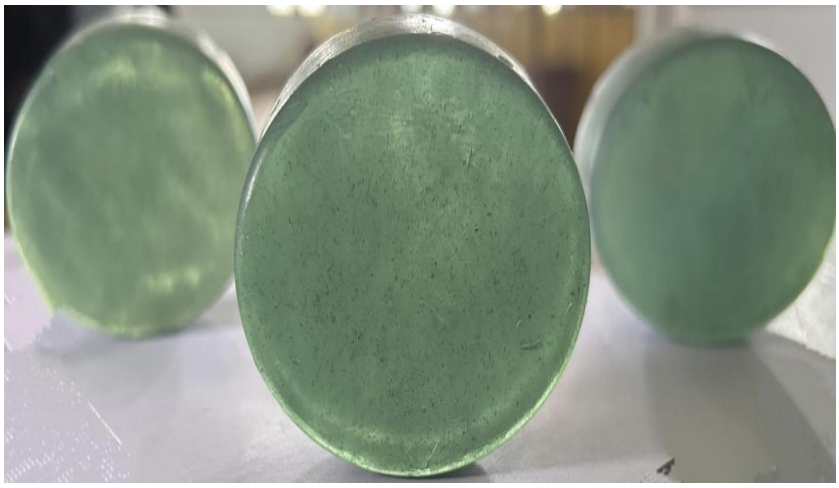


Fig 4: Herbal soap using dried powder of *Clitoria ternatea* Linn

Fig 5: Herbal Soap using flower extract of *Clitoria ternatea* Linn

Fig 6: Herbal soap made from *Clitoria ternatea* Linn

b. Evaluation of herbal soap using *Clitoria ternatea* flower

Parameters	Observation
Colour	Blue
Odour	Characteristic odour of C*litoria ternatea*
Shape	Oval
PH	7
Foam retention	Over 5 minutes
Foam height	4cm
Alcohol insoluble matter	2.5gm
Moisture content	33%
Foam stability	60%
Foam forming ability	8 cm
Wetting time	2.73 seconds
Skin irritation test	No skin irritation, redness, dryness
Dirt dispersion	High

Table no. 3: Evaluation of herbal soap using *Clitoria ternatea* flower

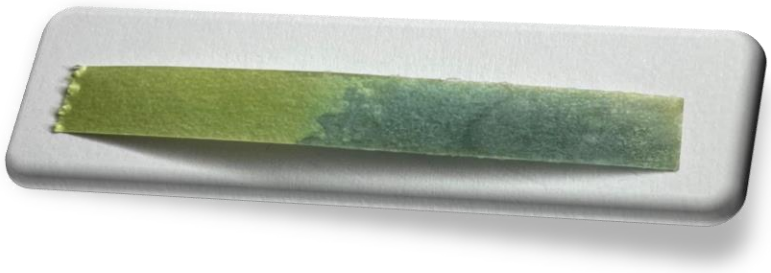


Fig 7: pH

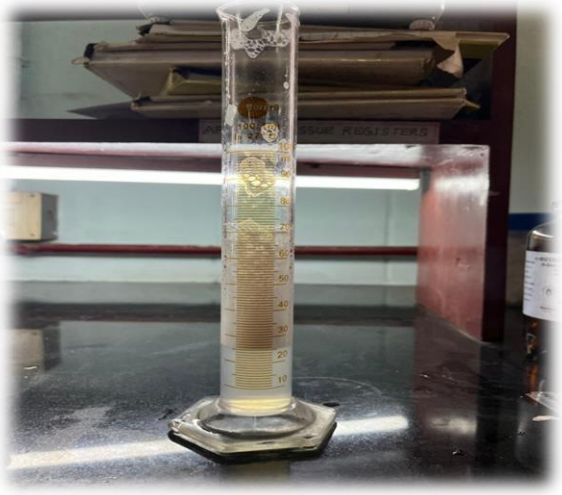
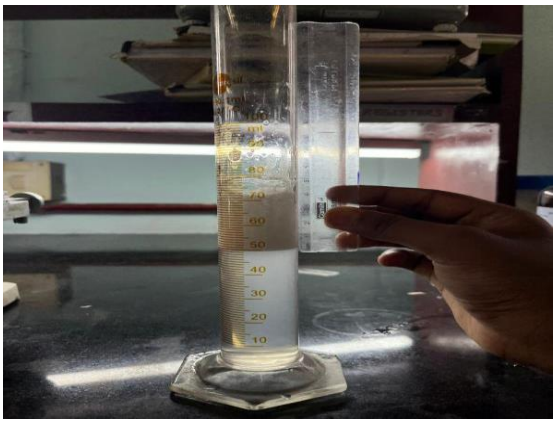


Fig 8: Foam retention



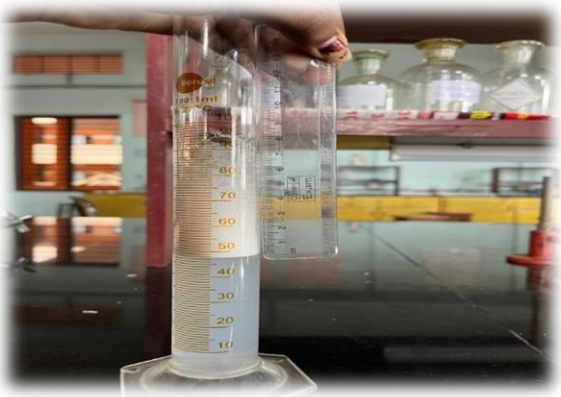
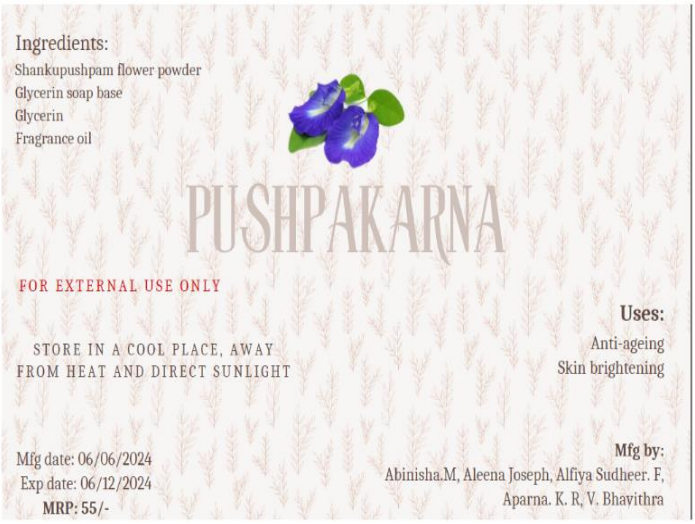
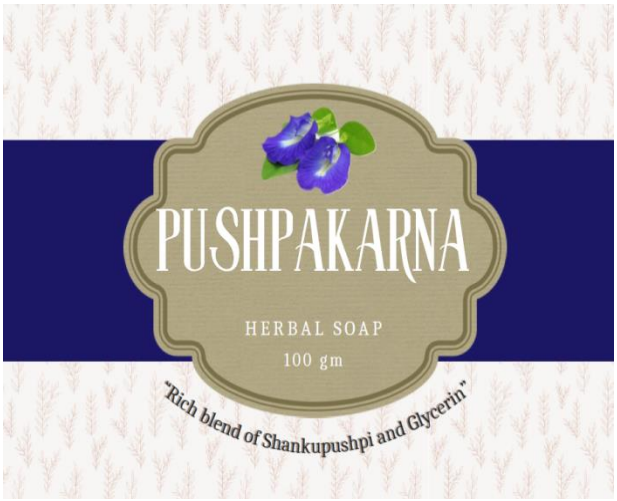


Fig 9: Foam forming ability

Fig 10: Skin irritation test





SUMMARY AND CONCLUSION:

This thesis work deals with the pharmacognostical, phytochemical and formulation studies on the flowers of *Clitoria ternatea* Linn, belonging to the family, fabaceae.

Pharmacognostical studies including morphological evaluation and microscopy were done on fresh flowers and dried powdered flowers.

The coarse flower powder was used for Soxhlet extraction method using solvent ethanol.

Preliminary phytochemical screening was done on ethanolic extract to identify the presence of various primary and secondary metabolites. Flavanoids, saponins, alkaloids, carbohydrates, proteins and amino acids, glycosides, steroids and triterpenoids, anthocyanins, terpenoids, phenolics and tannins were present on ethanolic extract.

Herbal soap was prepared from dried powder of flowers of *Clitoria ternatea* Linn, and also from the prepared ethanolic extract. After completion of formulation it was evaluated for various physicochemical parameters such as colour, odour, shape, Ph, foam retention, foam height, alcohol insoluble matter, moisture content, foam stability, foam forming ability, wetting time, skin irritation test and dirt dispersion. During the project work our team had finally achieved the desired results and formulation to make the herbal soap which does not contain harmful chemicals. It was nice learning and a great achievement for our team to prepare the herbal soap with balanced pH. After conducting further studies to ensure the safety of the herbal soap, we will introduce it in the market in the future.

Clitoria ternatea **Linn** holds immense medicinal potential and has been utilized since ancient times for various therapeutic purposes. Further quantification of major phytoconstituents, isolation of the compounds responsible for activity, spectral characterization of the isolated compounds, pharmacological studies to confirm the therapeutic activity is needed to yield a promising drug candidate for clinical trial, large scale manufacturing and marketing for future use.

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